



Regulatory framework for the assignment of the second digital dividend in Croatia

*Infofest 2015
Budva, Montenegro
28. September, 2015*



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INTRODUCTION




- ✚ **2012. World Radiocommunication Conference (WRC-12)**
 - ✚ Allocation of the second digital dividend band - DD2 (CH-49 to CH-60) for mobile services
- ✚ **2013. HAKOM granted licences for the first digital dividend (790-862 MHz)**
- ✚ **2015. World Radiocommunication Conference (WRC-15)**
 - ✚ Establishing frequency boundary between mobile services and TV
 - ✚ Discussion on the future of the UHF band 470-694 MHz
- ✚ **Two forums on the future of the UHF band in Croatia:**
 - ✚ Discussion about the necessary activities before the assignment of DD2
 - ✚ Opinion gathering from stakeholders about the current and future needs in the UHF band
 - ✚ Discussion about the cost of transition to DVB-T2 and expected investment in future services in the DD2 band






INTERNATIONAL REGULATORY FRAMEWORK



EC High Level Group

-  *Political view on the future of the UHF band*
-  *09/2014 „LAMY report 2020-2030-2025“*
 -  *Dedicated the 700 MHz band to wireless broadband across Europe by 2020 (plus/minus 2 years)*
 -  *Ensure regulatory security and stability for terrestrial broadcasters in the remaining UHF spectrum below 700 MHz until 2030*
 -  *Assess technology and market developments by 2025*




EC RSPG (Radio Spectrum Policy Group) UHF

-  *RSPG Opinion on a long-term strategy on the future use of the UHF band (470-790 MHz) in the European Union – 02/15*
 -  *700 MHz band for WBB by the end of 2020 (plus 2 years)*
 -  *Evolution of DTT platform in the UHF band (DVB-T2 and/or HEVC)*
 -  *Main usage – down streaming audio-visual content – even beyond 2030*
 -  *Future usage aspects - technological developments, consumer behaviour, free-to-air television importance, various political, social, cultural and economic interests*



INTERNATIONAL REGULATORY FRAMEWORK



ECC TG6 (Long Term Vision for the UHF band)

-  *11/2014 ECC Report 224 – Long Term Vision for the UHF broadcasting band*
-  *Technical and regulatory aspects, social, economical and cultural interests*
-  *General classes of scenarios considered by CEPT in defining the long term vision for the band 470-694 MHz (Class A, B, C, D)*

Plum Consulting and Farncombe study

-  *Ordered by the European Commission*
-  *Methods of delivering audio-visual content in the next 15 years*
-  *Possibilities of a convergent platform for delivering audio-visual content*
-  *Performance prediction of future technologies for delivering audio-visual and data content in the UHF band*

ADVANTAGES OF USING DD2 FOR MOBILE SERVICES



- ❖ *Improving accessibility of mobile networks*
 - ❖ *Better coverage and faster data transfer speeds*
 - ❖ *Accessibility of network and services in areas with poor coverage, especially in rural and closed areas (this can be achieved with coverage obligations)*
- ❖ *Possibilities for implementing new services and technologies*
 - ❖ *The DD2 band will be the only international harmonized band below 1 GHz which is an additional incentive for development of new services and technologies*
- ❖ *Reduced costs*
 - ❖ *Lower costs of mobile networks due to decreased number of mobile base stations – the operators will be able to secure larger network capacities simpler and cheaper*
 - ❖ *Prices for end users – due do substantial cost reduction in mobile networks lower data transfer prices are possible*

ADVANTAGES OF USING DD2 FOR MOBILE SERVICES



- ❖ *ECC decision 700 MHz MFCN (ECC DEC(15)01 – 03/2015) - Harmonised technical conditions for mobile/fixed communications networks (MFCN) in the band 694-790 MHz including a paired frequency arrangement (FDD 2 x 30 MHz) and an optional unpaired frequency arrangement (Supplemental Downlink)*

694-703	703-708	708-713	713-718	718-723	723-728	728-733	733-738	738-743	743-748	748-753	753-758	758-763	763-768	768-773	773-778	778-783	783-788	788-791
Guard band	Uplink						Gap	SDL (A)				Downlink				Guard band		
9 MHz	30 MHz (6 blocks of 5 MHz)						5 MHz	20 MHz (zero up to 4 blocks of 5 MHz)				30 MHz (6 blocks of 5 MHz)				3 MHz		

- ❖ *Alongside 2 x 30 MHz paired frequency arrangement this decision provides following possibilities for spectrum allocation at a national level:*
 - ❖ *Up to 4 x 5Mhz frequency blocks for MFCN networks to be used as SDL (Supplemental downlink)*
 - ❖ *For non MFCN usage such as PPDR, PMSE i M2M in the guard bands and duplex gap*

IMPACT OF DD2 ASSIGNMENT ON EXISTING DVB-T NETWORKS



- ❖ *DVB-T → DVB-T2 two transition options:*
 - ❖ *Implementing same sized DVB-T2 SFN networks as in the DVB-T system → increasing network capacity based on DVB-T2 system variant that keeps the current robustness of the DVB-T system → 65,5% per SFN network capacity increase*
 - ❖ *Implementing bigger DVB-T2 SFN networks → additional coverages are possible by expanding current networks to neighbouring allotments → new network capacity is achieved with additional multiplexes → 47,8% per SFN network capacity increase → due to additional coverages **the overall network capacity will be greater than in the first case** → this case requires frequency replanning and international coordination*
- ❖ *Choice of two coding standards H.264/AVC and H.265/HEVC:*
 - ❖ *DVB-T2 and H.264/AVC → current price of Set Top Box (STB) around 30 €*
 - ❖ *It is expected that the price drop and availability of H.265/HEVC devices will be great in the next few years*
- ❖ *Both coding standards require the change in the production and transmission chain as a change in user equipment (new TV sets or STBs)*

IMPACT OF DD2 ASSIGNMENT ON EXISTING DVB-T NETWORKS



Channel number estimation DVB-T2 @ 36.77 Mbit/s

	CBR			VBR		
	MPEG2	H.264	H.265	MPEG2	H.264	H.265
SD 576i	8	14	28	11	19	34
HD 720p	-	7	9	-	10	13
HD 1080p	-	4	6	-	5	8

Channel number estimation DVB-T2 @ 41.19 Mbit/s

	CBR			VBR		
	MPEG2	H.264	H.265	MPEG2	H.264	H.265
SD 576i	9	16	31	12	21	38
HD 720p	-	8	10	-	11	15
HD 1080p	-	5	7	-	6	9

IMPACT OF DD2 ASSIGNMENT ON EXISTING DVB-T NETWORKS



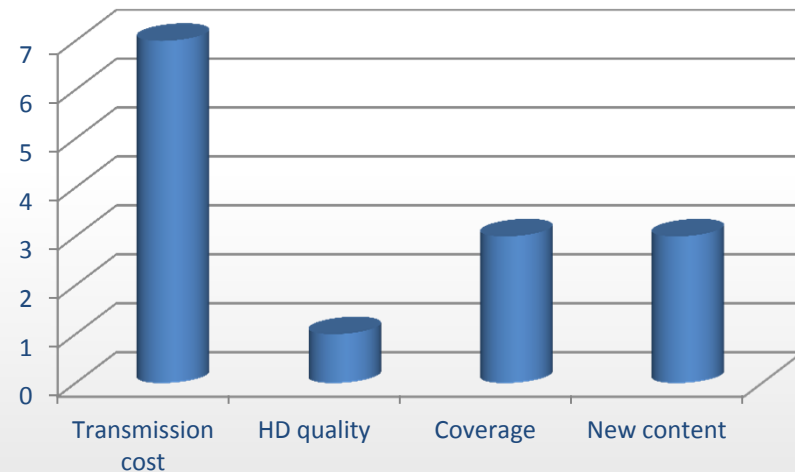
- ❖ *Multiplexes MUX A, B i D 11 national coverage programmes, 1-4 regional coverage programmes. MUX C i E Pay-TV platform*
- ❖ *Future networks needs:*
 - ❖ *At least 12-15 FTA programmes*
 - ❖ *One network with current SFN configuration, possibility of transmitting different content in each allotment (D1-D9) due to regional broadcaster needs*
 - ❖ *Local coverage networks alongside national coverage networks*
 - ❖ *New and more efficient broadcasting and coding standards*
 - ❖ *Improved image quality HD-legacy (HD720p) or Full HD (1080p)*
 - ❖ *Possibility of all public service broadcaster programmes in one multiplex with the same coverage*
 - ❖ *At least the same or greater coverage compared to current DVB-T system*

COST ANALYSIS OF SWITCHOVER TO DVB-T2



- ❖ *Switchover cost from multiplex operator and broadcasters side:*
- ❖ *Survey on video quality in digital terrestrial television networks → 13 broadcasters replied*

Most important aspect



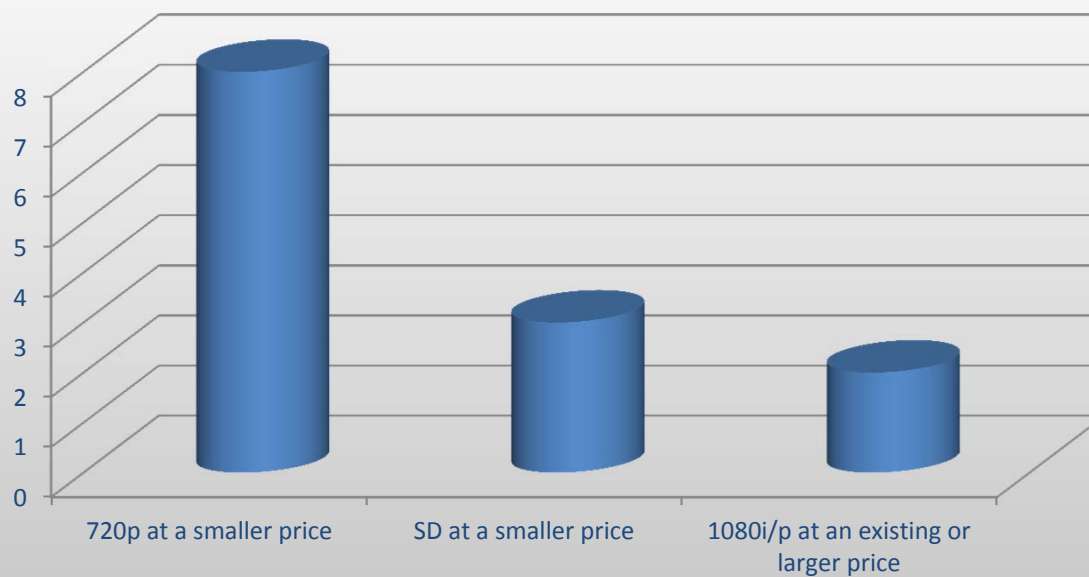
- ❖ *From them:*
 - ❖ *9 transmit in 16:9 format, the rest in 4:3 or combination of both*
 - ❖ *HD content on the production side varies from 0 to 100% → average 31,5%*
 - ❖ *11 broadcasters plan the switch to HD video quality in the next 1 to 5 years*
 - ❖ *9 broadcasters feel that transmitting in HD would make their programme more competitive on the market*
 - ❖ *The most important aspect is transmission cost*

COST ANALYSIS OF SWITCHOVER TO DVB-T2



- ❖ *If there was an option to transmit in HD, 7 broadcasters would be prepared to pay the same price as today, 2 less or equal and 4 less.*
- ❖ *The preferred broadcasting option is 720p at a smaller price– 8 broadcasters*

Preferred broadcasting option



COST ANALYSIS OF SWITCHOVER TO DVB-T2



- ❖ *2 broadcasters are fully ready for HD content production. The rest predict investment needs in the following range:*
 - ❖ *More than 15 M € for PSB*
 - ❖ *Around 700000 € for RTL*
 - ❖ *More than 150000 € NOVA TV – more exact amount requires detailed analysis*
 - ❖ *Around 500000 € for the rest of the commercial broadcasters that responded to the survey*
- ❖ *11 broadcasters think that there is not going to be need for UHD quality in digital terrestrial television networks in the next 5 years.*
- ❖ ***Switchover to DVB-T2 cost from the end consumer side:***
 - ❖ *The chance of all receiving equipment*
 - ❖ *Information campaign about the switchover*
 - ❖ *Possibility of government subsidies for receiving equipment?*
- ❖ ***Switchover cost from the network/multiplex operator side***

DD2 ASSIGNMENT - CURRENT SITUATION IN CROATIA AND EU



- ❖ *Two groups of EU countries:*
 - ❖ *Countries where the DTT is a dominant platform → they are not rushing into assignment of DD2 (Croatia)*
 - ❖ *Countries where other platforms are dominant (cable TV, satellite TV and IPTV) → early assignment of DD2*
- ❖ *Sweden, Finland, Germany and France have made a decision for early assignment of DD2 → 2015 - 2017*
- ❖ *Great Britain has made a decision that it will assign DD2 in 2020*

FUTURE DECISIONS AND CHALLENGES



- ❖ *Date for assignment of DD2/switchover to DVB-T2*
- ❖ *Choice of coding standard*
- ❖ *Labeling compatible consumer equipment*
- ❖ *Government subsidies for consumer equipment*
- ❖ *Social and cultural aspects of switchover to DVB-T2*

- ❖ *Preparation of assignment of DD2*
 - ❖ *Continuation of the replanning activities of DTT network*
 - ❖ *Continuation on the drafting of a national Strategy (switchover to DVB-T2 i and assignment of DD2)*

- ❖ *Media requirements in Croatia*
 - ❖ *Current and future needs for capacity in DTT multiplexes – number of programmes*
 - ❖ *Transition to HD quality*
 - ❖ *Further development of Pay-Tv in DTT*

- ❖ *Development of new trends and technologies in the UHF band*
 - ❖ *H.265/HEVC coding standard and UHD quality*
 - ❖ *Non-linear television*
 - ❖ *Broadcasting on mobile devices – DVB-T2 Lite, LTE eMBMS, hybrid networks*



CONCLUSION

- ❖ *Changes in the UHF band and the assignment of DD2 have a great impact on end consumers, industry and government → large organizational and financial challenge*
- ❖ *The aim is to ensure regulatory security, perspective and development possibilities for DTT and WBB networks → new and better services for end consumers*
- ❖ *A great number of activities needs to be done in order to preserve the existing services in DTT and make room for new and better services in DTT and WBB*
- ❖ *The DTT platform → switch to a more efficient technology (transmission and coding) and HD video quality*
- ❖ *A large investment amount in future technologies, infrastructure and services → expected in the next few years*



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